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Thank you so much for your support of this project.

Sincerely,

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EFFECTIVENESS OF A CD-ROM NUTRIENT ANALYSIS PROGRAM ON SELF-  
MONITORING BEHAVIOR OF ACTIVE DUTY MILITARY PERSONNEL  
RECEIVING NUTRITION COUNSELING FOR WEIGHT LOSS

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF SCIENCE  
IN THE GRADUATE SCHOOL OF THE  
TEXAS WOMAN'S UNIVERSITY

DEPARTMENT OF NUTRITION AND FOOD SCIENCES  
COLLEGE OF HEALTH SCIENCES

BY

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DECEMBER 1999

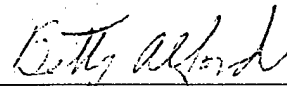
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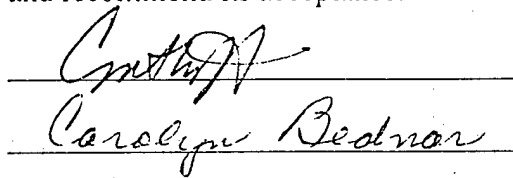
To the Associate Vice President for Research and Dean of the Graduate School:

I am submitting herewith a thesis written by Jane E. Heetderks-Cox entitled "The Effectiveness of a CD-ROM Nutrient Analysis Program on Self-Monitoring Behavior of Active Duty Military Personnel Receiving Nutrition Counseling for Weight Loss." I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Masters of Science with a major in Nutrition.



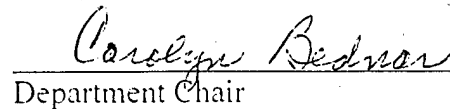
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We have read this thesis  
and recommend its acceptance:



Carolyn Bednar

Accepted:



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## CHAPTER I

### INTRODUCTION

The implications of being identified as overly fat (by body fat measurement) in the United States military are significant and include loss of promotion, restriction from duty-related travel, and even discharge from military service. Less than 3% of total Air Force active duty population are placed on the punitive Active Duty Mandatory Weight Management Program (ADWMP). However, there are many others considered overly fat but not identified by their commanders. Although weight or body fat status do not automatically identify someone as under fit, negative lifestyle factors such as lack of exercise and poor eating habits may also be present. These may detrimentally affect military "readiness" or the ability of a person to perform strenuous physical tasks during wartime deployment. Finally, poor lifestyle choices ultimately affect long term health risks and onset of disease.

Recently, computer technology has become a viable means of providing nutrition information to help educate and influence the public (1). However, few studies have been conducted examining the effectiveness of computer instruction on knowledge and outcome indices in the area of nutrition education of adult consumers or patients. More than one-third of Americans are classified as "obese" with resulting elevated risk for co-morbid conditions (2). However, only one study is published regarding use of computer aided instruction (CAI) in weight management. Dennison et al. (3), evaluated the use of

a computer CD-ROM by overweight, mostly blue-collar employees in a worksite setting. Individuals (n=93) were randomized into three groups: Group A (8-week "Weigh to Go" CD-ROM instruction), Group B (8-week "Weigh to Go" traditional classroom instruction with nutrition and exercise calculations conducted by staff), and Group C (no nutrition intervention). Outcome results at one year revealed clinically significant but statistically insignificant weight loss in groups receiving the intervention (an average 6.0 lbs. and 2.0 lbs for Groups A and B, respectively) while the control group gained weight. Dietary intake for the experimental groups was significantly lower than controls for polyunsaturated and monounsaturated fat only but were insignificant for total calories, protein, fiber, carbohydrate, sodium, and saturated fat. Authors attributed lack of statistically significant findings to a small sample size caused by dropout.

An interesting possibility for CAI may lie within the ability to use CAI to aid clients interested in the habit of self-monitoring. Self-monitoring has been described as one of the single most important predictors of successful weight loss in multiple studies (4,5,6,7,8); however, it consistently remains a secondary focus in obesity treatment (9). A recent study (9) validated the positive correlation between consistency of food record monitoring and a greater degree of weight loss. At the end of the 8-week study, participants who more consistently monitored all foods eaten lost a greater degree of weight than those who were less consistent. Considering this study as well as previously published studies, the authors propose a target of self-monitoring all foods eaten on at least 75% of days.

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Nutrition education is one method used by the Air Force in order to prevent and treat the incidence of over fatness in the active duty military population. A registered dietitian or diet therapy specialist conducts nutrition education using either classroom lecture or individual counseling. Recently, the military has experienced a reduction of available, qualified nutrition counselors and an increase in para professional nutrition counselors. Computer applications appear to be a feasible alternative for nutrition education delivery as many active duty members have computer access to accomplish work-related tasks and communication.

#### Purpose of Study

The purpose of this research was to compare the effectiveness of using a computer-based nutrient analysis database on self-monitoring behaviors of active duty military personnel receiving nutrition counseling for weight loss.

#### Objectives

1. To determine if participants who self-monitor using the CD-ROM record a greater number of study days compared with those who record using a food record booklet.
2. To determine if participants who self-monitor using the CD-ROM more thoroughly record their food and beverage intake compared with those who record using a food record booklet.

### Null Hypotheses

The null hypotheses tested in this study were as follows:

1. There will be no significant difference in the number of days recorded between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record booklet.
2. There will be no significant difference in the number of complete days of food records between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record. Completeness is defined as at least three clearly separate entries of foods a day (9).
3. There will be no significant difference in the average number of daily food items recorded between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record.

### Definitions

Computer Aided Instruction (CAI) – Student interaction with a computer to accomplish learning objectives without the active supervision of an instructor (1).

Self-Monitoring – A strategy that involves systematic observation and recording of target behaviors (9). The self-monitoring behavior under observation in this study is the recording of food and beverage intake.

## CHAPTER II

### REVIEW OF LITERATURE

#### Computers and Education

During the last 40 years, the processing power of computers has doubled every two years, and this trend is predicted to continue (11,12). Recently, computer technology has become a viable means of exchanging nutrition information to help inform and influence the public (1,12).

Computer programs exist as either stand-alone or online applications. Stand-alone (13) applications exist locally on the computer and run without connection to a network, modem, satellite, or other electronic communications technology. Software is usually distributed on media such as floppy disks, CD-ROM discs, and laserdiscs with accompanying floppy disks and can be run on computer workstations or kiosks. On-line applications are run across a connection such as a network on the Internet.

Issues and concerns from an education standpoint include computer literacy and training as well as cognitive processing. Computer training is a major educational issue. One study showed that the majority (80%) of highly educated medical faculty and professionals required help to use a computer package even though 57-90% of those surveyed had use of a computer at home (14). Human beings have difficulty organizing, directing attention to, and selecting the appropriate information. Learning the desired material is also a challenge as the individual can try to process too much information

at one time. Information processing relies on working memory as well as the structure or organization of information (15). Individuals can only process so much information; any additional information is either lost or forgotten (16).

In addition to informational processing considerations, an educator must consider the type of learning which will occur. There are essentially two kinds of learning possible: rote learning and meaningful learning. Rote learning involves acquiring new information without relating it to existing knowledge (17). Examples include memorization of material such as lists. The disadvantage of "memorization" is that the information is forgotten unless reviewed on a regular basis. On the other hand, meaningful learning occurs when new information is purposefully related to previous knowledge. Meaningful learning is an active, deliberate process that requires effort and discipline on the part of the learner. Thus, educators need to teach students more strictly on "how to learn."

#### Effectiveness of Computer Aided Instruction

CAI takes advantage of learning theories involving reinforcement of learning experiences, self-paced learning, and repetition of difficult material (13,18). It also may yield more interaction as well as individualized feedback to the user in terms of frequency, total volume, and quality than is possible in many classroom situations (19,20,21). Finally, it is more active than passive (22,23).

However, is CAI effective? The most recent meta-analysis (1995) on the effectiveness of CAI in the educational setting examined 120 studies published between 1987-1992 (24). Inclusion criteria were classroom implementation of CAI, provision of quantitative



results on an outcome variable measured in the same way for both experimental and control group, and freedom from obvious methodological flaws in group selection and treatment. Instructional outcome measured was student learning in the form of tests or exams given post completion of instruction. To determine effectiveness, authors measured effect size change between the control and experimental groups while considering several variables.

For most groups that implemented a posttest, mean scores were higher in the CAI group (36 reported cases with significant results, 16 cases not significant, and 22 unknown). Overall, scores were in favor of CAI. Researchers calculated that results show an effect size of 0.24 with a standard deviation of 53, meaning that in an average study, students in CAI classes had scores that were 0.24 standard deviations higher than those of control students with more traditional forms of instruction. This effect size was responsible for raising posttest scores in a typical study from the 50th to the 60th percentile. Effect size did not differ significantly with educational level, duration of treatment, teacher (same teacher), whether students were randomly assigned to groups, information retention over time or type of CAI (drill and practice, tutorial, etc.). Interestingly, when manual instruments or paper-and-pencil versions of the CAI material were implemented in the control group, no effect was observed. Moreover, the best controlled studies of long-term duration where the same materials were used and the same teacher taught both the experimental and contrast group, showed no beneficial effect for CAI. Because there is a lack of methodological control for novelty, the real learning advantage for CAI is

questionable (25). Researchers (25,28) seem to agree that any advantage to CAI is due to high quality materials as well as instructional content (clear objectives, sequenced instruction, interactive participation and feedback for learner) as a lot of time and effort is put into the design. So although CAI doesn't seem to promote any learning benefit when materials are the same, it is advantageous when materials are different (24). Attitudes toward computers as delivery vehicles did not change as these students probably had high attitudes initially. However, they did enjoy the courses and felt positive about quality of instruction (24). Interestingly, effect size was larger for females in contrast to previously documented "negative attitudes" by females (26,27). Thus, authors attribute the gain in proficiency to superior quality of CAI rather than use of computers as a vehicle of learning. Teachers usually don't have time to make materials that match the quality of CAI materials—and not for each student (28).

#### CAI Applications In Patient Education

Research indicates that access to health information enables patients to be more active participants in their treatment process, potentially leading to better medical outcomes (29,30,31). The use of computers in health outcomes communication and assessment of patients' preferences for health outcomes has been utilized (32,33,34,35). However, for the most part, there is limited empirical evidence of the outcomes of consumer health informatics (telecommunication and computer applications designed to be used by consumers to access information on a wide variety of health care information) and patient decision making tools or their use. According to a recent review (36), few controlled and

comparative studies exist on the effectiveness of tools intended to inform patients about their medical choices, treatment alternatives, and the risks and benefits of alternatives. Tools reviewed included interactive computer discs, videotapes, audiotapes, brochures and computer-generated fact sheets to help patients make decisions about medical screening and treatment. Only thirty controlled studies were identified. Some of the studies suggest that use of information tools can increase patient knowledge of treatment alternatives. Patients also reported that they like the tools. Some studies reported effects on treatment choice, but the number of underlying health conditions and range of tools studies were limited. Most research has looked more at the effects of the tools on patient knowledge and satisfaction than on patient-clinician communications and health behavior and outcomes. Tailoring messages to the needs of the patient has been found to be more effective (37) and has been found to be preferred by patients (38).

#### Dietetic Applications of Computer Aided Instruction

Dietetic-related stand-alone applications (consumer and professional) include the following: data collection, nutrient analysis, food service and recipe management, menu planning, clinical nutrition, drug-nutrient interaction, health risk assessment and lifestyle prescription, food and nutrition education, and related games (13). Computer software production packages that can assist in producing a computer-aided instruction module includes graphics packages, computer photograph and clip art collections, readability analysis, content analysis, qualitative analysis and presentation software (13).

Nutrient analysis programs have been used in education and counseling settings (from elementary school through medical school), in shopping malls, and at health fairs and science exhibits. Individuals using this type of program in nutrition education activities include Public Health and Cooperative Extension Service professionals, dietitians, fitness trainers, physicians, food scientists and food service professionals. Nutrient analysis programs have also been made available to consumers. The programs' effectiveness of calculations is considered well documented for identifying dietary excesses and inadequacies for research and nutrition education activities as well as teaching food composition (13).

Computerized Food Frequency Questionnaires (FFQ) have been used for easier and more reliable estimation of nutrient intake; however, they are difficult to administer and hardware is expensive(13). A current nutrition education application is Nutrition DIScovery (CD-ROM)<sup>TM</sup> (Nutrition DIScovery<sup>TM</sup>, 1995, Interactive Design and Development Inc. Available from Virginia Tech Corporate Research Park, 1700 Kraft Suite 1000, Blacksburg, VA 24060). which uses story telling, sound and video to reduce tedium. The user also receives immediate feedback while the computer tailors information according to input (13). Nutrition DIScovery is currently being tested for effectiveness. Researchers expect that multimedia applications will engage the user effectively and will result in a high percentage of completed and reliable questionnaires from people of all reading levels (13).

Computer programs have also been developed for use in food service, recipe management and menu planning. Some consumer menu planning versions are also being developed (13). Clinical nutrition applications have been developed which assess nutritional status of patients, identify nutrient-drug interactions, track medical and nutrition problems, provide preventive care reminders, and calculate body composition, growth and dietary risks (13). Finally, CAI has been used in the higher education setting to instruct education students, paraprofessionals, and professionals on nutrition. Topic examples include diet and disease, diet history methods, and patient case studies. Improvement in dietetic students' clinical reasoning skills has been observed after using such programs (39) as well as improved test scores (40). Use of computers for problem-based learning (PBL) is under investigation (41).

Most food and nutrition instructional programs have been designed for school-aged children (13). Only a few studies examine the use of computer applications on knowledge and outcome indices in the area of nutrition education of adult consumers or patients. Kramish Campbell, et al. (42) tested the effect of individually computer-tailored messages designed to decrease fat intake and increase fruit and vegetable intake in 558 primary care patients. The tailored intervention consisted of a one-time, mailed nutrition information packet tailored to the subject's stage of change, dietary intake, and psychosocial information. Messages were created to target each survey response choice regarding stage of change, motives, barriers, beliefs, and self-efficacy for each dietary behavior. The tailored intervention produced significant decreases in total and saturated

fat scores. Total fat was decreased in the tailored group by 23%, in the non-tailored group by 9%, and in the control group by 3%. There were no significant changes in fruit and vegetable intake. Finally, 70% of the tailored group recalled receiving a message compared with only 33% of the non-tailored group. One study with 697 Maine Women, Infants and Children (WIC) clients found increased scores in nutrition knowledge and intent to change eating behavior (43). Client comments regarding computers as vehicles of education were very favorable. Staff time and administration appeared maximized as well.

Campbell-Kramish, et al.. (44) recently designed and tested the effects of a multimedia program on dietary behavior of 526 low-income food-stamp program clients. The program consisted of a 15-minute video soap opera designed to model healthy dietary changes. The program also consisted of tailored infomercials that provided individualized feedback about dietary fat intake, knowledge, and strategies for lowering fat based on stage of change. Although there were no significant difference in the level of dietary fat reduction between the control and experimental groups, those who participated in tailored nutrition education experienced significant improvements in knowledge ( $p < .001$ ), stage of change ( $p < .05$ ), and certain eating behaviors ( $p < .05$ ).

#### Effectiveness of CAI Nutrition Education Applications in Weight Loss

More than one-third of American are classified as "obese" with a resulting elevated risk for co-morbid conditions (45). Dennison et al., (3) evaluated the use of a computer CD-ROM in overweight, mostly blue-collar employees in a worksite setting. The purpose of

the study was to determine whether a computer-assisted instruction nutrition program would assist employees in maintaining weight loss and dietary intake improvements for a one-year period. The intervention consisted of "Weigh to Go" CD-ROM which included computer-generated diet and exercise analysis and was based on the Activated Health Education model (AHE). AHE purports that for individuals to change their behavior, three basic principles need to be emphasized in any educational endeavor. The individual must play an active role in the process, should understand positive and negative influences that personal behavior has on health, and ultimately needs to take responsibility for managing his/her own health (3).

Individuals who were 20-35% over desirable weight (standard weight tables) were targeted. The experimental group (n=93 volunteer subjects) and control group (n= 40 volunteer subjects) were randomized into three groups. Group A received the 8-week Weigh to Go CD-ROM instruction. Group B received the 8-week Weigh to Go traditional classroom instruction with nutrition and exercise calculations conducted by staff. Group C received no nutrition intervention. Groups A and B received incentives given based on achievement of goals and completed a "Contract to Win" involving family and friends in goal achievement. Data measured included body weight and pre and post food intake (three day self reported food records with interview analyzed using a food database). Statistical analyses included ANOVAs and dependent t-tests to examine differences between pre-post intervention 1-yr. results. Alpha was set at  $.05/2 = .025$  to take into consideration use of two analyses for each nutrient category.

One year later, only 30 individuals remained with the study, and only 24 completed a post-assessment dietary recall. Group A lost 20.3 pounds, Group B lost 2.3 pounds, and the control group gained 2.0 pounds. However, these differences were not statistically significant either as a contrast among all three groups or between combined experimental vs control groups. Group A weight data was also skewed as one group member lost approximately 100 lbs. which prevented rejection of the null hypothesis. Even with the elimination of the outlier, the six pound difference between groups was statistically inconclusive ( $p=0.28$ ). Dietary changes for both indicated a significant difference in post-intervention for polyunsaturated and monounsaturated fats. Differences for total calories, protein, fiber, carbohydrate, sodium, and saturated fat were not statistically significant, although the latter approached significance in both the three group ( $p=0.06$ ) and two group ( $p=0.027$ ) controls. In sum, almost all changes with the experimental groups were in the anticipated direction. There were no significant differences between pre and post nutrient intake in the control group. Authors attributed lack of statistically significant findings to dropout resulting in small sample size. They did note that computer analysis of activity appeared to stimulate interest in exercise. Men reported using exercise rather than diet to influence weight. The authors also noted that experimental group participants enjoyed the computer although they initially appeared resistant.

“Healthy Highways” CD-ROM (46,47) is a personalized, interactive computer-based weight management program using behavior modification techniques developed by a multidisciplinary team. Components include information and activities for making



lifestyle changes for weight loss and maintenance including nutrition, fitness, and psychological barriers. Results are pending publication. Primary outcomes measured are weight change, and secondary end points include changes in glucose, lipids, blood pressure and quality of life as well as impact on staff time. These endpoints will be used to calculate cost-effectiveness of each intervention. Published results for several trials are pending for a newly developed and innovative handheld microcomputer (48) that includes nutrition and exercise components as well as behavior principles of goal setting, self-monitoring, stimulus control, and feedback and shaping.

Self-monitoring is considered integral in achieving and maintaining successful behavior change (49,50,51). Furthermore, self-monitoring has been described as one of the most single important predictors of successful weight loss often correlating with weight loss in multiple studies (52,53,54,55,56,57); however, it consistently remains a secondary focus in obesity treatment (9). A recent study (58) evaluated participants' perceptions of a weight-loss program and found that successful participants viewed "calorie counting" (n=247 participants) as being a useful component of a weight loss program. However, only 30% of the participants continued to use a given list of given self-regulating techniques (such as monitoring exercise, food intake, and weekly weighing). The authors suggested a need for better methods to help participants in the ongoing use of self-monitoring tools including individual tracking and innovative methods with specific information on effectiveness. No published studies have examined various methods of improving consistency of monitoring.

### Conclusion

In conclusion, computer use is increasing in popularity, and CAI may have some promising applications for educating the public and counseling clients on nutrition.

However, more research is needed to examine the effectiveness of various CAI applications in nutrition education on learning, attitude and health outcomes. An interesting possibility for CAI that no other authors have investigated according to literature and the author's knowledge is the ability to use CAI to aid clients interested in the habit of self-monitoring.

## CHAPTER III

### METHODS

#### Recruitment/Selection of Participants

All participants were on active duty status in the Air Force with research conducted at Lackland Air Force Base (LAFB) and Wilford Hall Medical Center (WHMC) in Texas. This study received approval from the Office of Clinical Investigation at Wilford Hall Medical Center (WHMC) and received "exemption status" from Texas Woman's University Human Subjects Review. WHMC is a medical treatment facility located at LAFB.

Active duty military personnel who attended weight management classes at the WHMC Outpatient Nutrition Clinic from February 11 through March 11, 1999 were recruited for participation in the study. The class distribution included those placed on the Mandatory Weight Management Program (thus, mandated by Air Force Regulation to attend the class) as well as active duty individuals who volunteered to attend. To enhance participation in the study, the study was announced through flyers which were posted at various locations on base and through base newspaper classified advertisements from mid January and through February 1999.

A convenience sample was obtained by assigning participants to one of two groups: a control or an experimental group. All participants who volunteered (or were assigned in the case of those on active duty weight management program status) to attend

the weight management class in February were assigned to the experimental group and during March to the control group. Study participant inclusion criteria included access to a windows-based computer (home or office), >18 years of age, active duty military status and ability to attend the CD-ROM Orientation (if assigned to the experimental group). Those who did not meet these criteria were excluded.

#### Description of Weight Management Class

The L.E.A.N. (Lifestyle, Exercise, Attitude, and Nutrition) weight management program consisted of one 90 minute class. Content included routine information such as weight loss principles, US Dietary Guidelines for Americans, Food Guide Pyramid, food portion sizes (using food models), basic behavior modification techniques for weight loss, and exercise information. Food and activity documentation using food record forms was also emphasized and reviewed. From February 11 through March 11, 1999, class times for both groups were extended by approximately 30 minutes to allow adequate time for participants to complete necessary paperwork for the study.

#### Executive Diet Helper CD-ROM Intervention for Experimental Group

Executive Diet Helper (EDH) (Executive Diet Helper, ©1997 Ohio Distinctive Software, Inc. Columbus, Ohio) is a CD-ROM multimedia nutrient database which contains approximately 5,000 foods including fast foods, frozen dinners, and diet foods. The program allows users to enter and analyze food and meals for a variety of nutrients. The program also recommends lower-calorie substitute foods and provides a comparative analysis of those foods (i.e., number of calories and milligrams of cholesterol, grams of

carbohydrates, protein and fat and the percentage of calories attributable to each). Users can add their own foods permanently to the database. Twenty copies of Microsoft Windows-based EDH software were donated by the company for use in the study.

#### Pre and Post Study Questionnaires

The pre and post study questionnaires and informational sheets were developed by the investigator. The information sheet included demographic information (education level, ADWMP status, etc) and requested email addresses, daytime and fax phone numbers for contact by the investigator during the study. The same pre-study questionnaire was administered to both groups and included computer usage questions. The post-study questionnaire, which included questions pertaining to attitudes and opinions on self-monitoring, was tailored for each group as appropriate. The research validated both pre and post-study questionnaires for content and readability by administering it to five nutrition or food science graduate students. Evaluation using the Microsoft Office grammar check software shows the questionnaire to be at the Flesch-Kincaid 7<sup>th</sup> grade reading level.

Participants were sent email reminders at week number five of the study requesting them to complete the post-study questionnaire at the Nutrition Clinic upon submitting their final food record booklet or printouts. If no questionnaire was submitted within two weeks of the subject completing the study, a second email reminder was sent with the post-questionnaire attached for electronic completion and return.

### Procedures at the End of Weight Management Class Session

At the end of the class session, the class instructor (a diet therapy technician) excused all non-active duty members (retirees, dependents, civilians, etc). The instructor announced the study purpose, components and participant benefits from a prepared script. Those who declined to participate were asked to voluntarily complete the informational sheet on reasons for declining to participate prior to leaving. Those who remained completed the pre-study questionnaire followed by a 24-hour dietary recall. They were given a 8.5"x11" sample food record sheet as an example. The instructor was present for questions and collected completed pre-questionnaires and dietary recalls.

Control group members were provided study instructions and a food record booklet for the initial week of the study including an additional page to copy as needed. Control group members were also given a calorie, fat, and cholesterol counter to aid in self-monitoring (59). In order to give attention to control group participants in lieu of their not attending an additional class, the investigator reviewed and performed nutrient analysis on 24-hour recalls for control group participants. Nutrient analysis was performed using the EDH CD-ROM with foods added to the database using Nutritionist IV Diet Analysis software (Nutritionist IV Diet Analysis™ ©1995, First DataBank Corporate Headquarters, San Bruno, CA) as needed. Report printouts containing nutrient analysis and the original 24 hour recall sheet were either mailed or faxed to the participants within two weeks of attendance at the weight management class. Nutrient

analysis printouts and 24 hour recall sheets included hand-written suggestions for improving food choices and enhancing completeness of food documentation.

#### EDH CD-ROM Orientation Class

Prior to being excused from the weight management class, experimental group participants were asked to sign up for the CD-ROM Orientation session of choice. A total of four EDH CD-ROM Orientation sessions were offered between February 19 and Mar 1, 1999. These dates allowed participants to attend the session and begin self-monitoring within two weeks of initial attendance at the weight management class. The investigator emailed participants one week prior to the orientation session and telephoned participants one day prior to the scheduled session as a reminder.

Sessions were held at computer labs located at WHMC or on base. During the one and a half-hour session, each participant was provided with a copy of the EDH CD-ROM with instructions for installation and use. Participants practiced loading the software onto the computer. The instructor guided participants in navigating through the software for the purpose of completing daily food records. Participants were taught how to search for specific foods, how to add foods to the database, and how to create and print daily food records. For practice, participants were given the 24 hour recall sheet they had completed during the weight management class. Participants were then asked to enter all items, create, save and print the file. Next, the instructor reviewed how to read and interpret the printout, including values listed for calories, fat, protein and carbohydrate.

Each participant was provided with 6 large envelopes (one for each week) labeled with instructions and appropriate dates for returning the printouts to the Nutrition Clinic. Finally, participants were provided a letter addressed to his/her supervisor requesting time (up to an hour daily) to use the CD-ROM during duty hours provided that it did not interfere with the participant's work related duties. The letter highlighted both military and health significance of the study.

#### Focus Group Sessions for the Experimental Group

Two 2-hour focus group sessions were scheduled on April 9 or 12, 1999. The purpose of the focus groups was to acquire additional qualitative data regarding self-monitoring using the EDH CD-ROM. Eight questions were developed by the investigator and were reviewed by five nutrition and food science graduate students for content and understandability. Experimental group members signed up to attend the session of their choice during the EDH CD-ROM Orientation. Because no scheduled participants attended the latter session, it was cancelled. The investigator facilitated the focus group session and briefed group members on the overall purpose of the session and ground rules. Participants were asked to respond in turn to each question which was read aloud by the investigator. The session was audiotaped and later transcribed using a word processing program. The text was then analyzed using Hyper Research Version 1.5 focus group software (HyperRESEARCH™ for Microsoft® Windows © copyright 1994 by ResearchWare, Inc. HyperRESEARCH © 1998-1993 by ResearchWare, Inc., Randolph, MA).



**Table 1****Focus Group Questions**

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Intro Question: In two words, about how successful were you in changing your eating habits for weight loss during this study? Would you say that you were “more successful”, “less successful”, “the same”, or “not sure” as compared to previous efforts?

How, exactly, did this software add to your awareness or knowledge about your eating habits?

How, exactly, did this software help you to improve your food choices for weight loss?

What further assistance, if any, from a dietitian or diet therapist would have better helped you to understand or to change your eating habits while using this software?

What did you like most about this software?

What did you like least about this software?

If you could change one thing to make the software better, what would you change?

Would you be willing to purchase the software you used for the study? If so, how much money would you be willing to spend?

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### Submission of Food Record Booklets or Printouts During the Study Period

Following the initial weight loss class (for control group participants) and the CD-ROM Orientation (for experimental group participants), participants were instructed to return to the nutrition clinic once weekly for six weeks to submit completed food records (food record booklet for control group participants or EHD printouts for experimental group participants). Upon submission of the completed hard copy booklet, control group participants were given a new food record booklet for the following week. To enhance food record return rate, small incentives such as magnets, notepads, and pencils were given weekly to all participants who submitted food records. The total cost of items was  $\leq \$10$  per participant. Funds were received from the Texas Woman's University Human Nutrition Research Committee. Finally, the investigator sent weekly email reminders to turn in food records to participants individually (if an email address was provided).

### Training of WHMC Nutrition Clinic Personnel

WHMC Nutrition Clinic personnel were trained on implementing various aspects of the study. Three diet therapy specialists and two administrative technicians, were trained on study procedures. A registered dietitian provided oversight and additional guidance in the primary investigator's absence. Diet therapy specialists were trained on administering, collecting, and storing the questionnaires and 24 hour recalls for pick up by the investigator. All personnel were trained on study sign-up procedures, food record data collection and storage, and administration of incentives.

Self-monitoring outcomes included the total number of days recorded and the quality of self-monitoring. Quality of self-monitoring was defined in terms of “completeness” of the records which was judged in two ways: the total number of items recorded per day and as the total number of “complete” days (defined as at least 3 or more separate food or calorie containing beverage entries per day). Attitudes and behavior towards self-monitoring were assessed using a post-study questionnaire. A focus group was conducted for experimental group members only to obtain additional qualitative data concerning the usefulness of the CD-ROM on self-monitoring behavior.

#### Treatment of Data

Descriptive data were summarized for both groups regarding demographic data, computer usage habits, and self-monitoring attitude responses from questionnaires. Study participation/drop-out rates were analyzed primarily by Chi-square tests. T-tests were used to compare the number of minutes spent each day recording and weight (pounds) lost between the two groups. Other descriptive data include the number of total days food records or printouts were submitted, the total number of “complete” days recorded and number/percentage of completed food records by individuals. These were compared using T-Tests.

## CHAPTER IV

### RESULTS

#### Demographic Characteristics

A total of 42 men and women from eight weight management classes at WHMC Nutrition Clinic completed the informational sheet. The control group consisted of 19 participants and the experimental group consisted of 23 participants. Thirty nine of 42 completed the pre-study questionnaire. Some responses were later collapsed due to the small sample size. A total of 43.5% (n=10) of those in the experimental group and 42.1% (n= 8) of those in the control group had not submitted food records during any week of the study. Therefore, these individuals were considered dropouts and were excluded from data analysis. Table 2 describes demographic information for the remaining participants. There was no significant difference between the experimental and control groups for age, gender, rank, or weight management program status. There was no significant difference between the groups regarding computer usage-related questions (Table 3).

#### Characteristics of Participant Dropouts

Of pre-study dropouts, age and education status were significant for those who dropped out (Tables 4 and 6). Those who were young and had no post-high school education were more likely to dropout. There was no significant difference in computer use of participants and dropouts (Table 5).

Table 2

**Demographic characteristics of active duty Air Force participants of self-monitoring for weight loss study**

	Number of Participants		Pearson's Chi Square (p) <sup>a</sup>
	Control (n=11)	Experimental (n = 13)	
<b>Age (Yrs)</b>			.305
20-29	NA	2	
30-39	8	6	
40-49	2	4	
50-59	1	1	
<b>Gender</b>			.973
Male	6	7	
Female	5	6	
<b>Rank</b>			.478
Enlisted	9	9	
Officer	2	4	
<b>Education</b>			.478
High school	2	4	
Post-High school	9	9	
<b>On ADWMP<sup>a</sup></b>	3	1	.162
<b>Previous nutrition counseling prior to study</b>			.094
None	4	3	
≥1 sessions	1	6	

<sup>a</sup>Statistically significant p value = 0.05

<sup>b</sup>Active Duty Weight Management Program

Table 3

**Computer usage and attitudes of active duty Air Force participants of self-monitoring for weight loss study**

	Number of Participants		Pearson's Chi Square (p) <sup>a</sup>
	Control (n=11)	Experimental (n = 13)	
<b>I am comfortable with my ability to use the computer</b>			.387
Disagree	1	NA	
Agree	10	13	
Neutral	NA	NA	
<b>I consider myself fairly experienced concerning my computer usage</b>			.096
Disagree	1	NA	
Agree	9	13	
Neutral	NA	NA	
<b>My access to a computer is at my...</b>			.486
Home	1	NA	
Office	4	4	
Both	6	9	
<b>The operating system I use at work is...</b>			.205
Windows	7	12	
DOS	3	1	
MacIntosh	NA	NA	
Don't know	1	NA	
<b>Have you used the computer to obtain health and fitness information?</b>			.392
Yes	4	7	
No	7	6	

<sup>a</sup> Statistically significant p value = 0.05

**Table 4**

**Demographic characteristics of active duty Air Force participants in self-monitoring for weight loss study (dropouts and participants)**

	Frequency of Responses		Pearson's Chi Square <sup>a</sup>
	Dropouts (n=18)	Participants (n=24)	
<b>Gender</b>			.327
Male	7	13	
Female	11	11	
<b>Rank</b>			.094
Enlisted	17	18	
Officer	1	6	
<b>Education</b>			.007
Highschool	12	6	
Post-Highschool	6	18	
<b>On AD WMP<sup>b</sup></b>	6	11	.238

<sup>a</sup> Statistically significant p value = 0.05

<sup>b</sup> Active Duty Weight Management Program

**Table 5**

**Computer usage of active duty Air Force participants in self-monitoring for weight loss study (dropouts and participants)**

	Frequency of Responses		Pearson's Chi Square <sup>a</sup>
	Dropouts (n=17)	Participants (n=24)	
<b>I am comfortable with my ability to use the computer</b>			.233
Disagree	2	1	
Agree	11	23	
<b>I consider myself fairly experienced regarding computer usage</b>			.315
Disagree	2	1	
Agree	13	22	
<b>My access to a computer is at my...</b>			.112
Office	10	8	
Home	0	1	
Both	5	15	

<sup>a</sup> Statistically significant p value = 0.05



**Table 6**

**Mean age of active duty Air Force dropouts and participants in self-monitoring for weight loss study according to treatment method**

	Control			Experimental			Independent T-Test <sup>a</sup>
	n <sup>b</sup>	M <sup>1</sup> Age	SD <sup>2</sup>	n <sup>b</sup>	M <sup>1</sup> Age	SD <sup>2</sup>	
<b>Age (Yr)</b>							.001
Dropouts	7	28.9	6.4	7	29.0	8.0	
Non-Dropouts	11	36.4	3.8	13	37.1	8.4	

<sup>a</sup> Statistically significant p value = 0.05

<sup>b</sup> Missing data for 3 individuals in the control and 1 individual in the experimental group

<sup>1</sup> = Mean      <sup>2</sup> = Standard Deviation

**Table 7**

**Degree of completion of food record records by active duty Air Force participants in self-monitoring for weight loss study**

	Control (n=11)		Experimental (n = 13)		Pearson's Chi Square <sup>a</sup>
	number	%	number	%	
<b>Completion</b>					.239
All 6 weeks	5	45.5	9	69.2	
1-5 weeks	6	54.5	4	30.8	
<b>Percentage of Study Days Recorded (Out of 42 Possible Days)</b>					.647
75-100% Days	5	45.5	9	69.2	
50-74% Days	2	18.2	1	7.7	
25-49% Days	2	18.2	1	7.7	
≤ 24% Days	2	18.2	2	15.4	

<sup>a</sup> Statistically significant p value = 0.05

**Table 8**

**Food record documentation by active duty Air Force participants in self-monitoring for weight loss study**

	Control (n=11)			Experimental (n = 13)			p <sup>a</sup>
	n	M	SD	n	M	SD	
<b>Average Number of Study Days Recorded By Participants (out of 42 possible study days)</b>	11	61.5	35.8	13	77.9	35.0	.773
<b>Average Number Days Per Week Recorded By Participant</b>	11	6.8	.61	13	6.9	.15	.374
<b>Average Daily Number of Items Recorded</b>	11	8.9	4.0	13	9.0	2.7	.980
<b>Daily Average Number of Minutes Spent Recording (Post-Study Questionnaire)</b>	5 <sup>b</sup>	11.3	4.6	9 <sup>b</sup>	12.9	5.0	.569

<sup>a</sup> P values calculated using an independent T-test. Statistically significant p value = 0.05.

<sup>b</sup> Data missing for 6 individuals in the control and 4 individuals in the experimental groups due to not completing questionnaire.

The remaining participants submitted at least one food record throughout the study period. However, not all individuals submitted food records for all six weeks of the study and were considered dropouts. By week 6, six of those in the control group and four of those in the experimental groups had dropped out (Table 7). Although fewer individuals in the experimental group dropped out, the values were not statistically significant.

#### Food Record Completion Rates

A total of 13 participants in the experimental group and 11 participants in the control group completed food records during the study period (Table 7). A total of nine experimental group participants and five control group participants submitted food records all six weeks. However, the number of individuals completing all six weeks of the study between groups was not statistically significant. Overall, there was no significant difference in the average number of days recorded during the study period between the two groups (Table 8). Nor was there a significant difference in the average number of days per week recorded by each participant. The experimental group documented an average of  $6.9 \pm .15$  days per week compared to  $6.8 \pm .61$  days per week for the control group. Furthermore, there was no significant difference in the number of items recorded between groups. Finally, post-questionnaire results revealed no significant difference in the amount of time spent recording items between groups. Out of a total possible 42 days (six weeks), the experimental ( $n=13$ ) and control ( $n=11$ ) groups recorded on 77.9% and 61.5% of study days, respectively. Nine individuals in the experimental group completed food records between 75% to 100% of days, compared to

five in the control group (Table 7). However, the percentage of days recorded for either group was not statistically significant.

There was no significant difference between the two groups in the completeness of food record documentation as defined by the average daily number of food items recorded (Table 8). Only food items containing greater than 25 calories were counted.

"Completeness" of food records as defined by "three clearly separate entries" was not possible to evaluate due to ambiguous documentation of meals and snacks by experimental group members. During the CD-ROM orientation, computer users were asked to draw lines between the items, indicating meal and snack groupings. This is because the computer printout did not distinguish between meals and snacks. Rather, all items were listed together, making it impossible to distinguish between separate entries. Approximately, one-third of food record printouts submitted did not include lines of demarcation.

#### Post-Study Questionnaire Results

A total of 14 individuals who finished all six weeks of the study completed the post test; 5 in the control group and 9 in the experimental group (Table 9). Because of the low number of participants remaining in the study, the majority of post-study questionnaire categorical responses were collapsed from 5 to 3 groups (neutral, agree, or disagree).

There was a significant difference ( $p < .032$ ) between the groups when asked "When I found foods that were high in calories/fat, I reviewed lower calorie/fat substitutes using printouts (experimental group), the fat, calorie, and cholesterol counter book (control

group), or using class materials (both groups). Significantly more individuals in the experimental group responded that they searched for lower fat/calorie substitutes more often than did the control group. One control group participant and 4 experimental group participants reviewed lower calorie/fat substitutes  $\geq 4$  times per week or 1-3 times per week, respectively. In addition, 60% of control group participants stated that they searched for lower calorie/fat substitutes "occasionally or never." There was also a significant difference ( $p=.032$ ) between the groups when asked "I changed my eating habits based on the lower calorie/fat items using the printout [experimental group]/ American Heart Association fat, calorie, cholesterol counter book [control group], or using class materials [both groups]." All nine of those in the experimental group reported they changed their eating habits based on available information about their food choices compared with only one of the control group participants. Six individuals in the experimental group compared their calorie and fat gram totals with estimated needs  $\geq 4$  times per week compared with only one individual in the control group; however, results were not statistically significant. There was no significant difference in the number of individuals who looked for foods in the diet that may have been providing excess calories or fat.

Finally, belief about the relationship between self-monitoring and weight loss approached significance between the groups ( $p= .085$ ). Four individuals in the experimental group compared with no individuals in the control group agreed with the

statement: "When I started recording my food intake I thought, 'Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits.'"

Six individuals in the experimental group and only 1 in the control group reported receiving 1 or more nutrition counseling sessions prior to the study Appendix C contains additional questions and responses regarding qualitative aspects of self-monitoring by group.

### Focus Group Results

Six of nine participants scheduled attended the first focus group session. The second session was cancelled as five of the six scheduled members had either cancelled or dropped out of the study. Transcribed data was processed using HyperResearch V 1.5 for response frequency. If the same individual repeated a particular response, this was counted as only one, not two responses. Overall, attitudes towards the software were positive. Most individuals believed that the software helped them to become aware of their eating habits and food choices. Results of the focus group will be addressed in the next chapter of this paper.

### Additional Post Study Questionnaire Results for Experimental Group

The post study questionnaire for computer users contained additional questions regarding participant's opinions regarding the software (Table 11 and Appendix C). There was no observable difference in the subject's primary site of software use (Table 11). Four used the software at the office, three used it at home while two used it both at home and at the office. The majority believed that the software was easy to use while no one found it

Table 9

Significant qualitative aspects of self-monitoring by control and experimental groups by active duty Air Force participants in a self-monitoring for weight loss study

Post Survey Question	Control (n= 5) n	Experimental (n =9 ) n	Pearson's Chi Square (p) <sup>a</sup>
<b>When I found foods that were high in calories/fat, I reviewed lower calorie/fat substitutes...</b>			.032
≥ 4 times/ week	1	4	
1-3 times/ week	1	5	
Occasionally or never	3	NA	
<b>I changed my eating habits based on available materials... (printout/calorie and fat gram counter or class materials).</b>			.032
Disagree	2	NA	
Agree	1	9	
Neutral	2	NA	
<b>Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits (pre-study).</b>			.085
Disagree	2	4	
Agree	NA	4	
Neutral	3	1	

<sup>a</sup> Statistically significant p value = 0.05

**Table 10**

**Additional qualitative aspects of self-monitoring by control and experimental groups by active duty Air Force participants in study of self-monitoring for weight loss**

Post Survey Question	Control (n= 5) n	Experimental (n =9 ) n	Pearson's Chi Square (p) <sup>a</sup>
<b>The software/book contained all of the food/beverage items I needed ...</b>			.108
Disagree	4	2	
Agree	1	6	
Neutral	NA	1	
<b>I compared my calorie totals to my estimated calorie needs...</b>			.222
≥ 4 times/ week	1	6	
1-3 times/ week	2	2	
Occasionally or never	2	1	
<b>I compared my fat gram totals to my estimated fat gram needs...</b>			.222
≥ 4 times/ week	1	6	
1-3 times/ week	2	1	
Occasionally or never	2	2	
<b>I looked for foods in my diet that may have been providing excess calories or fat</b>			.373
≥ 4 times/ week	2	5	
1-3 times/ week	2	4	
Occasionally or never	1	NA	
<b>I would describe my overall weight change during the study as follows:</b>			.255
Lost weight	5	7	
Gained weight	NA	NA	
Neither lost nor gained weight	NA	2	

<sup>a</sup> Statistically significant p value = 0.05



**Table 11**

**Additional post study questionnaire responses by experimental group of active duty Air Force participants (n=9)**

Post Survey Question	Frequency of Response (n)
<b>Primary Place of Software Use</b>	
Office	4
Home	3
Both	2
<b>The software was easy to use.</b>	
Disagree	NA
Agree	7
Neutral	2
<b>In addition to entering food intake using the software, did you use the blank food record form provided when away from your computer?</b>	
No	4
Yes	5
<b>The software contained all of the food/beverage items I needed without having to add many.</b>	
Disagree	2
Agree	6
Neutral	1
<b>I found adding this number of foods to the database a hassle</b>	
Disagree	4
Agree	3
Neutral	2
<b>I would rather use this software to track my fat and calorie intake than to do it manually using a pen/paper-based booklet and calorie/fat gram counter book.</b>	
Disagree	NA
Agree	9
Neutral	NA

difficult. Two responses were neutral. All found the printout easy to understand (Appendix C). The majority (n=6) believed that the software contained all of the food/beverage items needed without having to add many while three found that the number of items they needed to add was a hassle (Table 11). Four did not find the number of foods they added to be a hassle (Table 11). Finally, post survey responses indicated unanimous agreement that they would rather use the software than to self-monitor manually although many individuals also used a manual method until they were able to enter food items at their computer terminal (Table 11). Furthermore, eight experimental group participants stated intention to continue to use the software.

## CHAPTER V

### DISCUSSION AND CONCLUSION

The purpose of this research was to examine the effectiveness of use of a computer-based nutrient database on self-monitoring behaviors of active duty military personnel receiving nutrition counseling for weight loss. Although computerized educational programs are becoming more popular, there are not yet many consumer-based computerized nutrition programs (CD-ROM or Internet). However, it would seem that use of computer-based nutrition education may be a feasible method of delivery, especially, since many individuals have access to computers at work, at home, or both.

Previously, consistent self-monitoring has been correlated with greater weight loss than inconsistent self-monitoring. Becoming overweight can be a threat to one's military career. Self-monitoring may allow for more successful change of eating habits. Computerized nutrient databases may allow individuals to more readily and interactively calculate their nutrient intake and modify food choices accordingly.

This chapter will include a summary and discussion of the study's findings, followed by conclusions about the study findings and the study's limitations. The chapter concludes with recommendations based on these results.

#### Hypotheses Results

Two of the three null hypotheses tested were rejected based on the study results. The other hypothesis was not tested due to insufficient data. The hypotheses that were tested

(with a notation by those rejected) are as follows:

1. There is no significant difference in the number of days recorded between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record. (Rejected at  $p < .05$ )
2. There will be no significant difference in the number of complete days of food records between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record. Completeness is defined as at least three clearly separate entries of foods a day (9). (Unable to perform statistical analysis due to insufficient data)
3. There will be no significant difference in the completeness of food records defined as the average number of daily food items recorded between individuals documenting food and beverage intake using the CD-ROM nutrient database and individuals documenting their food and beverage intake using a hard copy food record. (Rejected at  $p < .05$ )

Study findings revealed that pre-study dropouts were significantly younger and less educated than those who continued to participate in the study. Although not statistically significant, more experimental group participants completed all six weeks of the study (submitted food records all six weeks) than control group participants.

Overall, there was no significant difference in the average number of food record days recorded between the two groups, although the experimental group documented a greater percentage of study days. There was no significant difference between the two groups in

the completeness of food record documentation as defined by the average daily number of food items recorded.

Post-Study Questionnaires revealed that significantly more individuals in the experimental group reviewed available materials (printout substitute list, class materials, etc.) after locating high fat and calorie foods in their diets and changed their food intake based on results of the printout. Although not statistically significant, experimental group participants compared their calorie and fat gram totals with estimated needs more frequently than control group participants. Finally, significantly more individuals in the experimental group appeared to believe that self-monitoring resulted in weight loss, independent of changing eating and activity patterns. There were no significant differences in self-reported weight changes during the study.

Significantly more individuals in the experimental group reported receiving one or more nutrition counseling sessions prior to the study. Finally, focus group participants (experimental group alone) revealed very positive attitudes about the software's ability to aid them in adopting healthier eating habits. Furthermore, they believed that registered dietitians and diet therapy specialists were valuable in providing guidance in conjunction with the CD-ROM program.

### Discussion

Because no studies to date (according to the investigator's knowledge) have investigated different methods of improving self-monitoring behavior, it is difficult to compare results of this study with others. Quantitatively, there was no statistically significant difference

in the number or percentage of days recorded between the two groups. However, those completing food records using the computer recorded approximately 2.5 more weeks than those in the control group. Likewise, the overall percentage of study days recorded for experimental group members exceeded that of those in the control group. In fact, experimental group members in this study exceeded the percentage of days recorded in a previous study (9) where authors concluded that individuals should monitor food intake on at least 75% of days. During the eight-week study, 45.6% of 59 participants monitored all foods eaten between 75% and 100% of days. During the present six week study, nine out of thirteen experimental group participants vs five out of eleven control group participants monitored anything eaten on  $\geq 75\%$  of study days (42 days or 6 weeks). Comparing results of this study again with respect to the lowest quartiles of self-monitoring ( $\leq 24\%$  study days), our percentages are similar to the previously quoted study at between 15-18% of participants. However, caution must be taken in interpreting this data because of obvious differences in definitions of a "complete" day and due to differing study length. In the previous study, a complete day was considered "3 separate food entries per day" whereas "anything recorded" was the definition used in this study. Regarding study length, perhaps recording would have diminished in this study if length were extended. Subjects in the aforementioned study had been involved in cognitive-behavioral weight loss treatment programs for an average of 17 months prior to the study. Thus, perhaps these individuals were further along in their treatment and had become less

review of worksite weight control interventions (0% to 26%; median, 3.5%)(60).

Reasons for dropout were not explored in this study. The author of the review cited numerous reasons associated with higher dropout rates which included: a greater number of previous weight loss attempts in formal programs, greater weight gain in the two weeks before treatment, higher weight-loss expectations, and higher estimates of current weight loss skills. Attrition rates were lower with incentives (median 20%) and were lower with competition (median 3.5%) (60). Because of an inadequate sample size it was not possible to determine the effect of the small prizes for participants in this study.

Evaluating the individual's "readiness" to engage in behaviors related to weight loss may have yielded additional information on dropout, study completion rates, and self-monitoring behavior. This study did not measure stage of change or any other cognitive-behavioral processes either in the beginning of the study nor during the study period. Prochaska et al. (61) found that more frequent attendance at weight control programs was related to being in the "action stage" (changing to behaviors associated with weight loss), greater use of stimulus control and counterconditioning, and less reliance on consciousness raising (increasing information about the problem.) Weight-history items positively predictive of attendance included having internal reasons for losing weight, the percentage of pounds overweight, the number of pounds participants wanted to lose, and the number of times participants had tried to lose weight in the past. Future studies that focus on participation and attrition rates would do well to include these variables.

consistent self-monitors compared to individuals from this study who were more likely to be in the beginning phase of their weight loss efforts.

Although not statistically significant, a greater number of experimental group participants completed all six weeks of the study compared with the control group members. The post study questionnaire revealed that experimental group members were in unanimous agreement that they would rather complete food records using the computer than a manual method. However, perhaps this group was biased towards computer use. The pre-study questionnaire indicated that seven experimental group members as opposed to four control group members had previously used the computer to research health and fitness information (Table 3), although the numbers were not statistically significant. On the other hand, perhaps pre-study questionnaire results for this question were biased as those in the experimental group were briefed that they would be using the computer prior to completing the questionnaire.

At the beginning of the study, 43% of participants did not submit any food records during the study. These dropouts tended to be younger and less educated (did not complete post highschool education) than those who completed the study. Mattfeldt-Beman, et al. (58) found that older participants (> 50 years) were more likely to attend weight loss program sessions. Future research may explore participation rates and relationship to age and educational status.

The overall attrition rate (defined as the number of participants who submitted food records during the study) was 42%, which exceeds attrition rates cited in an extensive



Both post-survey questionnaire and focus group results were positive in their feedback towards the software suggesting that the software may have resulted in greater behavior change by the experimental group members. Experimental group members indicated that they more frequently reviewed lower fat/calorie items and changed their eating habits accordingly. Focus group feedback revealed that participants enjoyed the autocalculation of calories and nutrients, lower calorie/fat substitutes list, and used the software to plan food choices for the day. Although Dennison et al. (3) also stated that computer group participants enjoyed their intervention CD-ROM, the study did not explore related qualitative aspects.

This study did not evaluate weight loss due to expected small sample size. However, the majority reported weight loss, and no one gained weight, although weight changes were not significant between the groups. Although it would appear that the control group lost more weight, the data was skewed as one member in this group reported 20 pounds of weight loss during the 6 week period. Dennison, et al. (3) with only 30 subjects remaining at the end of the study also found it difficult to determine statistical significance due to a small sample size. Interestingly, more experimental group members (n=4) appeared to have misconceptions regarding the relationship between self-monitoring and weight loss. Perhaps experimental group participants had an unrealistic expectation about the ability of technology itself to replace lifestyle change. Subjective review of food records for both groups revealed multiple high fat food choices daily for a large number of individuals. This observation led the investigator to question whether

participants believed that self-monitoring itself had a “magical” effect, replacing the adoption of healthy lifestyle changes for weight loss. This would be an interesting issue to pursue in a future study and highlights the importance of teaching individuals how to effectively use self-monitoring as a tool to change lifestyle habits. Boutelle and Kirschenbaum (9) caution that self-monitoring is not the causal agent in weight loss. These authors suggest that perhaps more consistent self-monitoring reflects general motivation such as commitment to losing weight, better coping skills, or other dispositional characteristics (5).

The investigator observed an advantage of computerized self-monitoring over manual methods in respect to the quality of information received. Oftentimes, reviewing food records can be tedious and frustrating when clients or patients do not give complete information about items consumed, especially if they are not available for questions. Automatic computer calculations resulted in complete calorie and nutrient information for all food items on printouts. In contrast, only 72% of food record days contained complete calorie information. Completeness was defined as calorie values recorded for  $\geq 75\%$  of items documented (excluding items with less than 25 calories) daily.

The investigator also noticed less ambiguity regarding the actual food items recorded on printouts. For example, instead of writing “cake...1 piece,” the computer program forced the user to enter a specific portion size. In addition, the software often included detailed information about the item eaten including the name brand, cooking method, etc.

This information is most certainly helpful for the dietitian when interpreting food record results for clients, who often fail to include detailed description of items consumed.

### Focus Group Results

Focus group participants were very enthusiastic about the software. The majority perceived that they were more successful regarding changing their eating habits as a result of the software compared to previous weight loss efforts. Respondents often stated that they adjusted their food intake throughout the day due to results from the printouts. Two individuals avoided eating items in order to avoid having to record them.

The majority of participants stated that the software helped them to become more aware of their eating patterns, portion sizes, and fat and calorie content of specific foods. Participants especially enjoyed the immediate feedback given by the software in terms of auto-calculation of calorie and nutrients along with the substitutions list. Two members had self-monitored and received nutrition counseling in the past and believed that their previous nutrition education helped them better utilize the information given. They also believed that assistance from a registered dietitian or diet therapist would have been beneficial in tailoring feedback to the individual by offering expanded low fat/calorie ideas and options. Two individuals desired more customized assistance, nutritional assessment and additional reinforcement for dietary changes. One individual, in particular, had been unsuccessful using the software until a diet therapy specialist pointed out areas for improvement and provided assistance in food choices and behavior

modification techniques. These comments are consistent with research stating that patients prefer tailoring of messages (37,38).

Participants praised the ease and quickness of the software. A couple of individuals made comments such as "It wasn't a pain like writing everything down manually and then having to look it up in a book...If I had to do that [record] by hand, there's no way I'd be doing it." The fact that these individuals did not perceive the software to be labor or time-intensive is interesting in light of the fact that there was no difference in the time spent recording between the two groups. Furthermore, five experimental group members manually recorded items (pending computer data entry) anywhere from two to seven days per week (n=3). Considering this, computerized self-monitoring may actually require more labor and time than the manual method.

Some focus group respondents indicated that the database was limited, although post questionnaire responses indicated that the database was adequate, containing most of the food items they ate. Members (n=6) added between 2-30 food items (mean of  $12.5 \pm 10.73$ ) to the database. Some commercial software packages may contain a more extensive nutrient database.

Desired improvements to the software included the ability to place items into meal and snack periods. The majority of members desired a simplified search key function rather than having to search for an item by category-type (dairy, meat, etc). This tended to lead to excessive "guessing" related to where a food item might be found. Some members reported that search field syntax was overly sensitive. Finally, participants desired the

software to track their calorie and nutrient intake, weight, and exercise progress over time.

In summary, the vast majority of comments and attitudes toward the software were positive. The group unanimously agreed that they would be willing to purchase the software for six to seven times the actual cost.

### Conclusion

In this study, those who self-monitored their food intake using the computer did not differ significantly in quantitative terms from those who self-monitored their food intake manually using pen and paper. However, there was a numerical trend for those who used the computer to experience a lower dropout rate and to record a greater percentage of study days. There was a significant difference in the self-monitoring behavioral responses of computer-users. Computer users more frequently reviewed materials for lower calorie/fat substitutes and reported changing their eating behavior as a result of the information given. Finally, computer printouts submitted were qualitatively superior containing more detailed descriptions and information on food and beverage items consumed including calorie and nutrient content, portion size, etc. However, it is important to realize that the software appears to be best utilized in conjunction with nutrition counseling from a registered dietitian or diet therapy specialist. Although all hypotheses were rejected, this research helps to support the idea that the computer may be used to assist individuals in successfully self-monitoring food calorie and nutrient intake for weight loss.

### Limitations

The results of this study must be viewed in the context of some limitations. Much of the study's inability to demonstrate effectiveness of the CD-ROM nutrient database on self-monitoring behavior may be due to small sample size. This led to statistically insignificant results despite some numerical trends. Extending the subject recruiting period would have resulted in a greater number of subjects and potentially, statistically significant data.

It was also not possible to define completeness of food records in terms of "three separate entries." Thus, it was not possible to compare results from this study with earlier research which initially prompted this study. If further research is to define quality of food record completion, the ability to categorize items consumed into separate meals and snacks should be considered.

The unequal amount of time spent with participants from each group may also have led to slightly more positive results in the experimental group. The investigator spent an additional two hours and scheduled a focus group session with the experimental group at the onset of the study (computer orientation). The control group members, although they received written nutrition feedback rarely had contact with the investigator except by correspondence (or by phone if the investigator needed to verify a mailing address). Perhaps the additional "face to face" attention led to a greater participant response burden in the experimental group. Finally, because of the fear that experimental group members' loose computer printouts would get lost (especially, if the member did not include their

code on each sheet), all experimental group members were given pre-dated and coded envelopes in which to turn in their printouts. Control group members were required to pick up a blank food record, which contained submission dates for members to look up and record on the cover. Perhaps this led to a unequal participant burden, causing control group members to turn in fewer food records and dropout.

Other limitations included the fact that participants were not randomly assigned to their respective groups. Participants were conveniently assigned to a group according to the date they attended the weight management. Perhaps, the members assigned to the first two weeks of the study (computer users) were more motivated, responding to the flyer (posted only two weeks earlier) by signing up for the weight loss class. Perhaps those less motivated responded by delaying study sign up.

Finally, this research should not be inferred to the general population due to education characteristics unique to this study population. The United States Air Force may be considered highly educated as all members must possess a minimum of a GED or high school diploma before entering. Another related consideration is computer access as well as a certain level of comfort with using the computer and the software application (Windows Vs MacIntosh-Based). All members of this study had computer access either at home or at their worksite and 100% indicated a high level of experience and comfort with computers. In contrast those in a lower socioeconomic status may not have computer access and may have limited experience and comfort with computers.

### Recommendations

In consideration of the study findings and associated limitations, recommendations for further study can be made. Because of the high dropout rate, the study recruitment period should be extended until an adequate number of subjects participants to achieve statistical significance for food record and post questionnaire variables. Earlier consultation with a statistician revealed that each group would require a minimum of 25 subjects. It would be interesting to pursue cognitive-behavioral aspects of self-monitoring through additional pre and post study questions.

In order to qualitatively evaluate documentation, software that groups foods by meals, snacks or by time of day should be utilized. In order to equalize participant burden, both groups should also receive pre-coded and pre-dated food record booklets at the onset of food record/printout completion.

Further research may document the effectiveness of progress tracking features and actual weight loss. In order to give equal attention to both groups, a separate class on food record completion should be given to control group members while the experimental group receives computerized instruction. Finally, users of nutrition-based programs should have basic nutrition knowledge in order to correctly interpret their results and make related decisions about their food intake.



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## APPENDICES

## APPENDIX A

Texas Woman's University Approval To Conduct Research

WHMC Approval To Conduct Research



TEXAS WOMAN'S  
UNIVERSITY  
DENTON / DALLAS / HOUSTON

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HUMAN SUBJECTS  
REVIEW COMMITTEE  
P.O. Box 425619  
Denton, TX 76204-5619  
Phone: 940/898-3377  
Fax: 940/898-3416

January 12, 1999

Ms. Jane Heetderks-Cox  
1300 Dallas Drive #322  
Denton, TX 76205

Dear Ms. Heetderks-Cox:

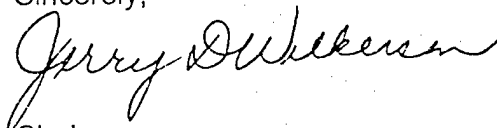
Social Security #

Your study entitled "Effectiveness of an Internet Web Site on Self-Monitoring Behavior of Active Duty Military Personnel Receiving Counseling for Weight Loss" has been reviewed by a committee of the Human Subjects Review Committee and appears to meet our requirements in regard to protection of individuals' rights.

Be reminded that both the University and the Department of Health and Human Services (HHS) regulations typically require that agency approval letters and signatures indicating informed consent be obtained from all human subjects in your study. **These consent forms and agency approval letters are to be filed with the Human Subjects Review Committee at the completion of the study.** However, because you do not utilize a signed consent form for your study, the filing of signatures of subjects with the Human Subjects Review Committee is not required.

Your study was determined to be exempt from further TWU HSRC review because this study has been reviewed and approved by Wilford Hall Medical Center's Clinical Institutional Review Board and all subjects are located at the site where this IRB approval was obtained. However, another review by the Committee is required if your project changes. If you have any questions, please feel free to call the Human Subjects Review Committee at the phone number listed above.

Sincerely,



Chair  
Human Subjects Review Committee

cc. Graduate School  
Dr. Betty Alford, Department of Nutrition & Food Sciences  
Dr. Carolyn Bednar, Department of Nutrition & Food Sciences



Wilford Hall Medical Center  
Institutional Review Board (IRB)

59 Clinical Research Squadron/MSRP  
1255 Wilford Hall Loop  
Lackland AFB, TX 78236-5319

(IRB is organized and operates according to Good Clinical Practices and the applicable laws and regulations)

NOTICE OF ACTION REGARDING IRB REVIEW

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Date: 6 Jan 99

MEMORANDUM FOR MSR/MAJOR ELIZABETH BRIDGES

FROM: 59 CRES/MSRPP (Protocol Support) (2-7143)

SUBJECT: EXEMPT PROTOCOL MSRP# 99EX036 "EFFECTIVENESS OF AN INTERNET WEB SITE ON SELF-MONITORING BEHAVIOR OF ACTIVE DUTY MILITARY PERSONNEL RECEIVING NUTRITION COUNSELING FOR WEIGHT LOSS"


1. Your AFI 40-403 EXEMPT PROPOSAL received expedited review on behalf of the WHMC Institutional Review Board by the Commander, Clinical Research Squadron on 6 Jan 99. It was approved as written. Your study is approved and may begin once you come by the Protocol Support Office to sign the signature page and enter the date of study initiation (must be after date of final approval). This second signature indicates activation of the protocol.

2. Please forward a copy of the final report to MSRPP (Protocol Support Office) when the study is completed. An annual Progress Report will be due to the Protocol Office no later than **1 Nov 99**. We recommend keeping progress notes on all protocols. Laboratory notebooks are available through the Clinical Research Squadron's Laboratory Supply Section, ext 2-7159, or the 59th MDW Non-Medical Supply (ordered through your supply personnel). NOTE: Bound notebooks may be required for protocols being considered for subjects.

Please note items marked with an "x" below that apply to your study:

☐ FY99 Research Division funding in the amount of      was approved. Please contact SSgt Sumaya, at ext 2-7141 to make an appointment to discuss the procurement of requested supplies, equipment, service contracts or animals. At no time are you authorized to procure any of these items through channels other than the Research Division. **YOU ARE NOT AUTHORIZED TO USE YOUR SECTION'S O&M FUNDS TO SUPPORT YOUR PROTOCOL.**

☐ Please contact Ms Barbara Gaiser, External Resources Coordinator, ext 2-5203, regarding documentation and receipt of external resources.

  
ELKA M. SANCHEZ, SRA USAF  
Assistant, Protocol Coordinator  
Protocol Support

Info copy to:

- ☐ SSgt Sumaya w/proposal
- ☐ Ms Gaiser w/Proposal

## APPENDIX B

Information Sheet (Both Groups)

Pre Study Questionnaire (Both Groups)

Post Study Questionnaire: Experimental Group (Computer Users)

Post Study Questionnaire: Comparison Group (Food Journal Booklet Users)

## (INFORMATION SHEET)

### ***WISH TO DECLINE***

*Although you have chosen not to participate in this study, your voluntary answers to these brief questions are much appreciated and will still help us design nutrition education programs for the future. Thank you.*

Do you have access to a personal computer? ☐ Yes ☐ No

2. Do you have access to the Internet (check) ☐ Yes ☐ No

If you answered "yes" is access via (circle) Home Office Other \_\_\_\_\_

3. Please indicate the reason (s) you decided not to participate in this study:

☐ worried about getting identified for the active duty mandatory weight management program

☐ will be "TDY" or on leave

☐ lack of time

☐ just not interested

☐ Other (describe): \_\_\_\_\_

### ***WISH TO PARTICIPATE***

Please complete the following information and print neatly. Please write the code down somewhere where you'll remember it as you will be asked to write it on future food journal printouts and questionnaires. Thank you.

Name (Last, First, MI) \_\_\_\_\_ Age \_\_\_\_\_ Sex (circle) M F

Rank/Grade \_\_\_\_\_ Daytime Phone: \_\_\_\_\_

Email address: \_\_\_\_\_

Do you read your email daily (Mon-Fri)? ☐ Yes ☐ No

Fax #: \_\_\_\_\_

Unit Address: \_\_\_\_\_ Current Position: \_\_\_\_\_

Today's Date: \_\_\_\_\_

**PLEASE WRITE YOUR CODE HERE:** \_\_\_\_\_

(Choose a word or number you'll remember such as your dog's name. You will write this code on future questionnaires)

## PRE-STUDY QUESTIONNAIRE

Thank you for agreeing to participate in our efforts to better determine how to meet the nutrition needs of our active duty members. If you have any questions about how to fill out this questionnaire, please ask the diet therapy specialist. All information will be kept confidential.

**CODE: (Enter your code here):** \_\_\_\_\_

Education Level Last Completed (circle):

\_\_\_ Highschool \_\_\_ College

If college, check degree received: \_\_\_ Associates \_\_\_ Undergraduate \_\_\_ Post Graduate

Are you on the mandatory Active Duty Weight Management Program? \_\_\_ Yes  
\_\_\_ No

Are you going TDY or on leave in the next 6 weeks? \_\_\_ Yes \_\_\_ No  
If yes, indicate the number of days: \_\_\_\_\_ (give dates if possible: \_\_\_\_\_)

### General Computer Usage

The following questions relate to your computer usage and habits.

1. I am comfortable with my ability to use the computer

Strongly Disagree      Disagree      Agree Somewhat      Strongly Agree

2. I consider myself fairly experienced concerning my computer usage.

Strongly Disagree      Disagree      Agree Somewhat      Strongly Agree

3. My access to a computer is at my (check all that apply): \_\_\_ Home \_\_\_ Office

4. The operating system I use at work is?

\_\_\_ Windows-Based (Applies to most Air Force computers)

\_\_\_ Type?( if known): \_\_\_ Windows 95 or 98 \_\_\_ DOS (Windows 3.1 or lower)

\_\_\_ Macintosh

\_\_\_ Don't know

4. Have you ever used the computer to obtain health and fitness information?

\_\_\_ Yes \_\_\_ No If yes, please describe. (Examples: topics of information researched, how information used):

## POST STUDY QUESTIONNAIRE

(Computer Users)

**ENTER CODE NUMBER: \_\_\_\_\_ Please ask us if you've forgotten it.**

1. Where did you use the software the majority of the time?

\_\_\_\_ Home \_\_\_\_ Office \_\_\_\_ Used both equally

\_\_\_\_ I did not use the software (Check this if you used the software less than 1 week).

Please describe the reason(s). You may then turn in your questionnaire.

2. The software was easy to use.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

3. On average, how many minutes per day did it take to enter and save your food intake? \_\_\_\_ Number of Minutes Per Day

4. In addition to entering your food intake using the software, did you use the blank food journal form provided (or notebook, dayplanner, paper etc) when you were away from your computer?

\_\_\_\_ No

\_\_\_\_ Yes If yes, how many days per week, on average? \_\_\_\_

5. The software contained all of the food/beverage items I needed without having to add many.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

6. I added approximately \_\_\_\_ (total number) of my own food/beverage items to the User Foods database.

7. I found adding this number of foods to the database a hassle.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

8. The printout was easy to read.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

9. The printout was easy to understand.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

10. I compared my calorie totals to my estimated calorie needs calculated in the weight loss class.

Daily    4-6 times per week    2-3 times per week    Weekly    Occasionally    Never

11. I compared my fat gram totals to my estimated fat gram needs calculated during the weight loss class.

Daily    4-6 times per week    2-3 times per week    Weekly    Occasionally    Never

12. I looked for foods in my diet that may have been providing excess calories &/or fat.

Daily    4-6 times per week    2-3 times per week    Weekly    Occasionally    Never

13. When I found foods that were high in calories and/or fat, I reviewed the lower calorie/fat items listed at the bottom of the printout.

Daily    4-6 times per week    2-3 times per week    Weekly    Occasionally    Never

14. I changed my eating habits based on the lower calorie/fat items suggested with the software or using suggestions given during the weight loss class.

Strongly Disagree    Disagree    Neutral    Somewhat Agree    Strongly Agree

15. The following items below *strongly motivated me* to continue recording my food intake throughout the study period. Check all that apply.

- ☐ Weekly email reminders to turn in my printouts
- ☐ Weekly incentives
- ☐ The opportunity to win grand or runner up prizes
- ☐ The thought of losing weight
- ☐ Learning about my eating habits
- ☐ Learning how to change what I was eating
- ☐ Feeling "accountable" to someone
- ☐ Other (describe):

16. Prior to this study, have you ever recorded your food and beverage intake in order to lose weight?

☐ Yes ☐ No

17. I would rather use this software to track my fat & calorie intake than to do it manually using a pen/paper-based booklet and calorie/fat gram counter book.

Strongly Disagree    Disagree    Neutral    Somewhat Agree    Strongly Agree

18. Do you intend to continue to use the software? \_\_\_ Yes \_\_\_ No

Why?

19. a. Indicate technical problems you experienced when installing or using the software (check all that apply):

\_\_\_ No Problems

\_\_\_ "Projector" Type General Protection Fault Error

\_\_\_ Machine Freezes at Program Start-Up

\_\_\_ Problems With Colors

\_\_\_ Unable to Install Software

\_\_\_ Printing Problems

\_\_\_ Inadequate Memory

\_\_\_ Other: \_\_\_\_\_

b. Did you contact technical support for assistance? \_\_\_ Yes \_\_\_ No

If yes, were the problems resolved? \_\_\_ Yes \_\_\_ No If no, describe.

c. Technical problems significantly interfered with my ability to use the software to complete my food journals.

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

20. When I first started using the software I thought:

"Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits."

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

21. Since I've finished the study, I think:

"Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits."

Strongly Disagree

Disagree

Neutral

Somewhat Agree

Strongly Agree

22. I would describe my overall weight change during the study as follows:

\_\_\_ I lost \_\_\_ number of pounds.

\_\_\_ I gained \_\_\_ number of pounds.

\_\_\_ I neither lost nor gained weight.



23. Please indicate the types of nutrition counseling you have received *prior* to the study (do not count the weight loss class you attended at the beginning of the study):

☐ None

☐ Attended weight management class previously (indicate # weeks attended: )

☐ LEARN (Lifestyle, Exercise, Attitude, Relationships, Nutrition) program  
(Indicate # weeks attended: )

☐ One-on-one counseling with a registered dietitian or diet therapy technician

☐ Other (please describe):

24. Are you currently enrolled in nutrition counseling outside of the study (such as the LEARN program, Weight Watchers or appointments with a dietitian/diet technician)?

☐ Yes ☐ No

**POST STUDY QUESTIONNAIRE**  
(Food Journal Booklet Participants)

**ENTER CODE NUMBER: \_\_\_\_\_ Please ask us if you've forgotten it.**

1. Recording using the food journal booklet was easy.

Strongly Disagree      Disagree      Neutral      Somewhat Agree      Strongly Agree

Why?

2. I calculated my daily calorie intake.

Daily    4-6 times per week      2-3 times per week      Weekly      Occasionally      Never

4. I calculated my daily fat gram intake.

Daily    4-6 times per week      2-3 times per week      Weekly      Occasionally      Never

5. On average, how many minutes per day did it take to record your food intake (including adding up calorie and fat grams)? \_\_\_\_\_ Number of Minutes Per Day

5. The American Heart Association Fat (and calorie) book contained all of the food/beverage items I ate.

Strongly Disagree      Disagree      Neutral      Somewhat Agree      Strongly Agree

6. I compared my calorie totals to my estimated calorie needs calculated during the weight loss class.

Daily    4-6 times per week      2-3 times per week      Weekly      Occasionally      Never

7. I compared my fat gram totals to my estimated fat gram needs calculated during the weight loss class.

Daily    4-6 times per week      2-3 times per week      Weekly      Occasionally      Never

8. I looked for foods in my diet that may have been providing excess calories and/or fat.

Daily    4-6 times per week      2-3 times per week      Weekly      Occasionally      Never

9. When I found foods that were high in calories and/or fat, I reviewed the American Heart Association Book or materials given during class for lower fat/calorie foods I might select later.

Daily    4-6 times per week    2-3 times per week    Weekly    Occasionally    Never

10. I changed my eating habits based on the lower calorie/fat items suggested during the weight loss class.

Strongly Disagree    Disagree    Neutral    Somewhat Agree    Strongly Agree

11. The following items below *strongly motivated me* to continue recording my food intake throughout the study period. Check all that apply.

- ☐ Weekly email reminders to turn in my food journal booklets  
☐ Weekly incentives  
☐ The opportunity to win grand or runner up prizes  
☐ The thought of losing weight  
☐ Learning about my eating habits  
☐ Learning how to change what I was eating  
☐ Feeling "accountable" to someone  
☐ Other (describe):

12. Do you intend to continue to record your food and beverage intake? ☐ Yes ☐ No  
 Why?

13. When I first started recording my food and beverage intake I thought:

"Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits."

Strongly Disagree    Disagree    Neutral    Somewhat Agree    Strongly Agree

14. Since I've finished the study, I think:

"Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits."

Strongly Disagree    Disagree    Neutral    Somewhat Agree    Strongly Agree

15. I would describe my overall weight change during the study as follows:

- ☐ I lost  number of pounds.  
☐ I gained  number of pounds.  
☐ I neither lost nor gained weight.

16. Please indicate the types of nutrition counseling you have received *prior* to the study (do not count the weight loss class you attended at the beginning of the study):

- ☐ none  
☐ attended weight management class previously (indicate # weeks attended: )  
☐ LEARN (Lifestyle, Exercise, Attitude, Relationships, Nutrition) program  
(indicate # weeks attended: )  
☐ One-on-one counseling with a registered dietitian or diet therapy technician  
☐ Other (please describe):

17. Are you currently enrolled in nutrition counseling outside of the study (such as the LEARN program, Weight Watchers or appointments with a dietitian/diet technician)?

- ☐ Yes ☐ No

*Thank you for your time!!*

PLEASE TURN IN THIS FORM TO THE INDIVIDUAL  
ADMINISTERING IT

## APPENDIX C

Qualitative Aspects of Self-Monitoring by Group

Additional Post Study Questionnaire Responses

### Qualitative Aspects of Self-Monitoring by Group

Post Survey Question	Comparison (n= 5)		Experimental (n =9 )		Pearson's Chi Square (p)
	n	%	n	%	
<b>I compared my calorie totals to my estimated calorie needs...</b>					.222
≥ 4 times/ week	1	20.0	6	66.7	
1-3 times/ week	2	40.0	2	22.2	
Occasionally or never	2	40.0	1	11.1	
<b>I compared my fat gram totals to my estimated fat gram needs...</b>					.222
≥ 4 times/ week	1	20.0	6	66.7	
1-3 times/ week	2	40.0	1	11.1	
Occasionally or never	2	40.0	2	22.2	
<b>I looked for foods in my diet that may have been providing excess calories or fat</b>					.373
≥ 4 times/ week	2	40.0	5	55.6	
1-3 times/ week	2	40.0	4	44.4	
Occasionally or never	1	20.0	NA	NA	
<b>Currently enrolled in nutrition counseling outside of study</b>					.439
No	5	100.0	8	88.9	
Yes	NA	NA	1	11.1	
<b>Do you plan to continue to use the software/ record your food intake?</b>					.207
No	2	40.0	1	11.1	
Yes	3	60.0	8	88.9	
<b>Self-monitoring is an effective way to lose weight even if I don't change my diet and exercise habits (post-study).</b>					.123
Neutral	1	25.0	NA	NA	
Agree	NA	NA	4	44.4	
Disagree	3	75.0	5	55.6	

<sup>a</sup> Statistically significant p value = 0.05

### Additional Post Study Questionnaire Responses: Experimental Group

Post Survey Question	Frequency of Response	
	n	%
<b>The software contained all of the food/beverage items I needed without having to add many.</b>		
Disagree	2	22.2
Agree	6	66.6
Neutral	1	11.1
<b>The printout was easy to read.</b>		
Disagree	NA	NA
Agree	8	100.0
Neutral	NA	NA
<b>The printout was easy to understand.</b>		
Disagree	NA	NA
Agree	8	100.0
Neutral	NA	NA

## APPENDIX D

Computer Printout Page

Sample Food Journal Booklet Page



## Executive Diet Helper

File: COIFEB01

1st 3 letters of code Food journal date

79

## =====

FOOD ITEM	AMT (oz)	CALORIES (kcal)	CARBO (gm)	PROT (gm)	FAT (gm)	CHOL (mg)
OATMEAL, COOKED ----->	9	149	26	6	2	0
*ORANGE JUICE, FROM CONCENTRATE ----->	4	51	12	1	0	0
*COFFEE, BLACK ----->	6	3	1	0	0	0
LIGHT TABLE CREAM ----->	1	27	1	0	3	9
*SKIM MILK ----->	8	79	11	8	0	4
PEPPERONI PIZZA ----->	6	447	43	22	21	42
McDONALD'S SIDE SALAD ----->	4	60	3	4	3	41
*FAT FREE ITALIAN SALAD DRESSING ----->	1	4	1	0	0	0
DIET SODA: DIET COKE, DIET PEPSI ----->	12	3	0	0	0	0
CHICKEN BREAST, MEAT ONLY, ROASTED ----->	3	140	0	26	3	72
ASHED POTATOES, W/MILK & MARG ----->	4	120	19	2	5	2
INNER ROLL, WHEAT ----->	1	76	13	2	2	0
*GREEN BEANS, FROZEN (BOILED) ----->	4	29	7	2	0	0
*SKIM MILK ----->	8	79	11	8	0	4
VANILLA ICE CREAM, 10% FAT ----->	5	267	31	5	15	59
Total for 15 items :	74	1534	179	86	54	233

Lines separate meals and snacks from each other

carbohydrates (1 gm = 4 Kcal)---> 46% of calories  
 protein (1 gm = 4 Kcal)-----> 22% of calories  
 fat (1 gm = 9 Kcal)-----> 31% of calories

## =====

FOOD ITEM	AMT (oz)	CALORIES (kcal)	CARBO (gm)	PROT (gm)	FAT (gm)	CHOL (mg)
*FARINA, COOKED ----->	9	121	26	3	0	0
*TOMATO JUICE ----->	4	19	5	1	0	0
WATER ----->	6	0	0	0	0	0
HALF AND HALF CREAM ----->	1	18	1	0	2	5
WATER ----->	8	0	0	0	0	0
PIZZA WITH MUSHROOMS ----->	6	357	43	18	12	27
No substitute food identified ----->	0	0	0	0	0	0
*CIDER VINEGAR ----->	1	2	1	0	0	0
CLUB SODA ----->	12	0	0	0	0	0
FISH, COD, UNPREPARED ----->	3	70	0	15	1	37
*BAKED POTATOES, WITHOUT SKINS ----->	4	105	24	2	0	0
*LOW CALORIE RYE BREAD ----->	1	53	12	3	0	0
*ASPARAGUS, FRESH ----->	4	26	5	3	0	0
WATER ----->	8	0	0	0	0	0
HARD VANILLA ICE MILK ----->	5	185	30	5	6	19
Total for 15 items :	70	956	147	50	21	88

carbohydrates (1 gm = 4 Kcal)---> 60% of calories  
 protein (1 gm = 4 Kcal)-----> 20% of calories  
 fat (1 gm = 9 Kcal)-----> 19% of calories

NAME \_\_\_\_\_

DATE: \_\_\_\_\_

Meal/Snack	Food/Beverage Item	Amount	Calories	Fat (gm)
BREAKFAST				
LUNCH				
DINNER				
SNACK(s)				
Totals:				

DATE: \_\_\_\_\_

Meal/Snack	Food/Beverage Item	Amount	Calories	Fat (gm)
BREAKFAST				
LUNCH				
DINNER				
SNACK(s)				
Totals:			80	

## APPENDIX E

Study Instructions: Experimental Group Members

Study Instructions: Control Group Members

## INSTRUCTIONS FOR COMPUTER STUDY PARTICIPANTS

### **1. PURPOSE AND DURATION OF STUDY:**

The purpose of this study is to determine effectiveness of nutrition education methods for active duty military members and will involve recording all food and beverages consumed for a period of 6 weeks. The study will require that you make 6 visits (one each week) to the WHMC Nutrition clinic to drop off computerized food journals during your participation. You will also be asked to attend a computer class and voluntary focus group session.

### **2. PRIZES:**

You will receive small weekly incentives upon returning the printouts. In addition, grand and runner up prizes will be awarded to those who complete the greatest number of weeks of the study. **Note:** Winners will be notified at the end of the study (First week of May).

**Grand Prize:** Personalized nutrition counseling for your family in your own home! Registered Dietitian, *Capt Cox will personally visit your home to assess your kitchen contents* and how well they meet the nutritional needs of your family, including tips on how to best stock your cupboards, refrigerator and freezer with healthy food items. Capt Cox will also share "fast" foods to keep on hand when battling busy schedules. Multiple related handouts and recipes will be included. Awarded to the person completing the greatest number of weeks of the study. In case of a tie, all individuals will receive personalized nutrition counseling. If living in the dorm, you may opt to have lunch with Capt Cox to discuss ways to steer clear of excess fat, saturated fat and calories while dining on base.

**Runner Up Prizes:** Recipe makeover! Give Capt Cox the recipe to your favorite, richest, dish and she will give it a "lift" regarding calories, fat and saturated fat. Awarded to the next 3 individuals completing the greatest number of weeks in the study.

### **3. COMPUTER CLASS:**

Schedule an appointment with the Nutrition Clinic (292-7587) to attend a computer class to receive your software, learn how to install it (extremely easy process) and how to complete computerized food journal printouts. Please circle the class you are scheduled for and mark it on your calendar.

<u>Date</u>	<u>Time</u>	<u>Location*</u>
Friday, 19 Feb 99 7C34	1300-1430 hrs	Wilford Hall Medical Center: 7th floor, Rm
Monday, 22 Feb 99 room	0830-1000hrs	Main Base Library Bldg 6114, computer
Friday, 26 Feb 99 7C34	1300-1430 hrs	Wilford Hall Medical Center: 7 <sup>th</sup> floor, Rm
Monday, 1 Mar 99 room	0830-1000hrs	Main Base Library Bldg 6114, computer

\*Note: Enter Main Base Library through the back door as main doors will be locked. See attach map for directions to Main Base Library. For Wilford Hall, take main elevators to 7<sup>th</sup> floor, turn left at corridor, then right at the next corridor. Continue straight until you get to the "C" wing then turn right at the next hallway (by nurses station) then take an immediate right. First room on your right. Contact 292-7886 if you get lost.

3. For questions regarding the study, please contact 2Lt Tauai at 292-5737. Or email Capt Cox, the investigator at [Janehcox@aol.com](mailto:Janehcox@aol.com).

WRITE YOUR CODE HERE:

## **COMPUTER NUTRITION SOFTWARE STUDY**

(Computer Orientation Class)

### **Installing Executive Diet Helper (EDH) CD-ROM**

1. Read License Terms—for the purposes of the study you may install the program on both your work and home PC. Follow installation procedures listed on package insert. You must uninstall the program following the study (in 6 weeks).
2. Be sure you install the software on a computer hooked to a printer.

### **TECHNICAL SUPPORT**

If you experience any difficulties while installing or running the program contact [support@ohio-distinctive.com](mailto:support@ohio-distinctive.com) OR visit their website @ [www.ohio-distinctive.com](http://www.ohio-distinctive.com) and go to "support."

While running the program you may also click on the "HELP" button at any given time or review the program package insert. Finally, if you experience computer difficulties, contact your systems administrator (phone numbers below).

### **COMMON SENSE STUFF**

Your participation in this study should not affect your work performance or ability of your organization to accomplish its mission. It is suggested that if using this product at work you use your lunch hour or non-duty time.

### **UNINSTALL EXECUTIVE DIET HELPER SOFTWARE AS FOLLOWS:**

1. Go to "start," then "settings," then click on "control panel" then double-click on "add/remove programs" icon.
2. Scroll down to "Executive Diet Helper" and highlight. Click "Remove." Confirm file deletion.
3. Alternative method: Double click on "my computer," double click on "C-drive." Look for ODS file, right click, then left-click to delete that folder including all its contents.

## PHONE NUMBERS

1. For questions about this research study and procedures contact 2Lt Tauai at 292-5737 or email the investigator, Capt Cox at [janehcox@aol.com](mailto:janehcox@aol.com)
2. Contact your systems administrator if you have questions. WHMC (2-3751) or Lackland AFB (2-2622).

## COMPLETING FOOD JOURNALS

1. Click on "START" go to "PROGRAMS," locate "Executive Diet Software CD" and click.
2. Click "Yes" after reading disclaimer. You will now be at the MAIN MENU.
3. Enter food items consumed by clicking on appropriate food category.
4. Type in the food name (or first 3 letters or so—correct spelling). May need to return to the main menu and try other categories/spellings if you can't find the item.
5. Click on the appropriate food to highlight it. Note portion size and adjust as needed (using food labels if available can be helpful when approximating how much you've consumed).
6. Click on "Calculate." Note nutrient values below. If ok, "Add to Report."  
Your food will be listed under "Chosen Foods" as an "Untitled File" at this point.
7. Click on "Save." Note filename box on upper left that is highlighted "untitled."
8. NAME THE FILE: Type in the name of the date of food journal day you're entering as follows: 1<sup>st</sup> 3 characters of your CODE followed by the 3-character abbreviated MONTH followed by the 2 digit DAY.

EXAMPLE: CodFeb01

You should only create **ONE FILE PER DAY (24 Hour period)**. For example, don't combine 2 days together under 1 file name.

Note: If using EDH on 2 computers, suggest you save your input to a floppy disc (a:drive) so you can carry it with you. Otherwise, you won't be able to get a daily total if entering some foods at work and others at home during the same day.

9. Click "OK." This "file" is now saved and you may view it at any time to add/delete items as needed. Go to main menu to add more items or click "EXIT" when finished. Try your best to record items as soon as possible after consuming them so you don't forget.
10. To delete foods, go into the file, click on the item to highlight it then click "DELETE."
11. Use blank food journal form provided (xerox copies if needed) to cover periods you will not be able to access Executive Diet Helper due to TDY, leave, the weekend, etc.

#### INSTRUCTIONS FOR PRINTING OUT FOOD JOURNALS

You will be asked to submit food journal printouts once per week using envelopes provided to the nutrition clinic. This program allows you to print out only 1 day/file at a time.

1. From Main Menu, click on "OPEN." Refer to the dates on the cover of the envelopes we have given you for submitting printouts in order to know which dates to print.
2. Click on the desired file date so that you see it in the "File Name" box at top left of screen.
3. Click "OK." You will see your "chosen foods" that you entered that day. At this point you may add or delete foods if needed before printing it.
4. Click "PRINT" and wait.
5. Repeat until you've printed a copy of each date. Place all printouts into the provided envelope. **BE SURE YOUR CODE IS WRITTEN ON THE FRONT OF THE ENVELOPE.**



### ENTERING YOUR FAVORITE FOODS

1. From MAIN MENU, click on "USER FOODS."
2. From your food label, enter the portion size weight and all corresponding nutrient values for the given portion size. (You must fill in all values)
3. Click on "ADD FOOD."
4. In order to see the food you've added click on "ADD USER FOODS."  
All of your entries will appear. Click on the one you want to highlight/view.

### FOCUS GROUP

**I WANT YOUR INPUT!** Please circle one of the dates and times below for the session you can attend. During this session I'd like you to complete a post-survey as well as discuss if and how this software assisted you in changing your eating habits. Your input is valuable in determining future nutrition education needs of our Air Force members as well as adding to the body of literature and science.

Friday, 9 April 1300-1430 at WHMC Rm 7C34 (Computer lab)

Monday, 12 April 0830-1000 hrs at the Base Library

"Starting Date" (Date of Computer Class)	Dates for Food Journal Keeping	Date to Return Printouts to Nutrition Clinic
19 February	19-25 February (Week 1) 26 Feb-4 March (Week 2) 5-11 March (Week 3) 12-18 March (Week 4) 19-25 March (Week 5) 26-1 April (Week 6)	26 February (Week 1) 5 March (Week 2) 12 March (Week 3) 19 March (Week 4) 26 March (Week 5) 2 April (Week 6)
22 February	22- 28 February (Week 1) 1- 7 March (Week 2) 8-14 March (Week 3) 15-21 March (Week 4) 22-28 March (Week 5) 29March -4 April (Week 6)	1 March (Week 1) 8 March (Week 2) 15 March (Week 3) 22 March (Week 4) 29 March (Week 5) 30 March (Week 6)
26 February	26-Feb -4 March (Week 1) 5-11 March (Week 2) 12-18 March (Week 3) 19-25 March (Week 4) 26 March - 1 April (Week 5) 2-8 April (Week 6)	5 March (Week 1) 12 March (Week 2) 19 March (Week 3) 26 March (Week 4) 2 April (Week 5) 9 April (Week 6)
1 March	1-7 March (Week 1) 8-14 March (Week 2) 15 -21 March (Week 3) 22 - 28 March (Week 4) 29 March- 4 April (Week 5) 5 - 11 April (Week 6)	8 March (Week 1) 15 March (Week 2) 22 March (Week 3) 29 March (Week 4) 5 April (Week 5) 12 April (Week 6)

## INSTRUCTIONS FOR STUDY PARTICIPANTS

### 1. PURPOSE AND DURATION OF STUDY:

The purpose of this study is to determine effectiveness of nutrition education methods for active duty military members and will involve recording all food and beverages consumed for a period of 6 weeks. The study will require that you make 6 visits (one each week) to the WHMC Nutrition clinic to drop off food journals during your participation.

### 2. INCENTIVES:

You will receive small weekly incentives upon returning food journal booklets. In addition, grand and runner up incentives will be awarded to those who complete the greatest number of weeks of the study. **Note:** Winners will be notified at the end of the study (first week of May).

**Grand Prize:** Personalized nutrition counseling for your family in your own home! Registered Dietitian, *Capt Cox will personally visit your home to assess your kitchen contents* and how well they meet the nutritional needs of your family, including tips on how to best stock your cupboards, refrigerator and freezer with healthy food items. Capt Cox will also share "fast" foods to keep on hand when battling busy schedules. Multiple related handouts and recipes will be included. Awarded to the person completing the greatest number of weeks of the study. In case of a tie, all individuals will receive personalized nutrition counseling. If living in the dorm, you may opt to have lunch with Capt Cox to discuss ways to steer clear of excess fat, saturated fat and calories while dining on base.

**Runner Up Prizes:** Recipe makeover! Give Capt Cox the recipe to your favorite, richest, dish and she will give it a "lift" regarding calories, fat and saturated fat. Awarded to the next 3 individuals completing the greatest number of weeks in the study.

### 3. PROCEDURES:

**Complete food journal booklet daily BEGINNING TODAY and return it once each week to the WHMC Nutrition Clinic staff during the next 6 weeks.** See the first page of the booklet for an easy way to track the dates for your journal keeping. You will receive a small incentive and a new booklet for the next week. If you are unable to return to the clinic for a day or two or are going to be on leave or TDY that week, please use the extra form provided to make copies until you can return to the clinic for a new booklet. **BE SURE TO WRITE YOUR CODE AND DATES OF THE FOOD JOURNAL DOCUMENTATION PERIOD. FINALLY, PLEASE USE ONLY 1 FORM PER DAY.**

## APPENDIX F

### Study Advertisement Flyer

*Uniform Fitting A Little Tighter than Usual?  
Having a Hard Time Dropping Those Few Extra Holiday Pounds?  
Want to Get an Early Start & Shape Up for Swim Suit Season?*

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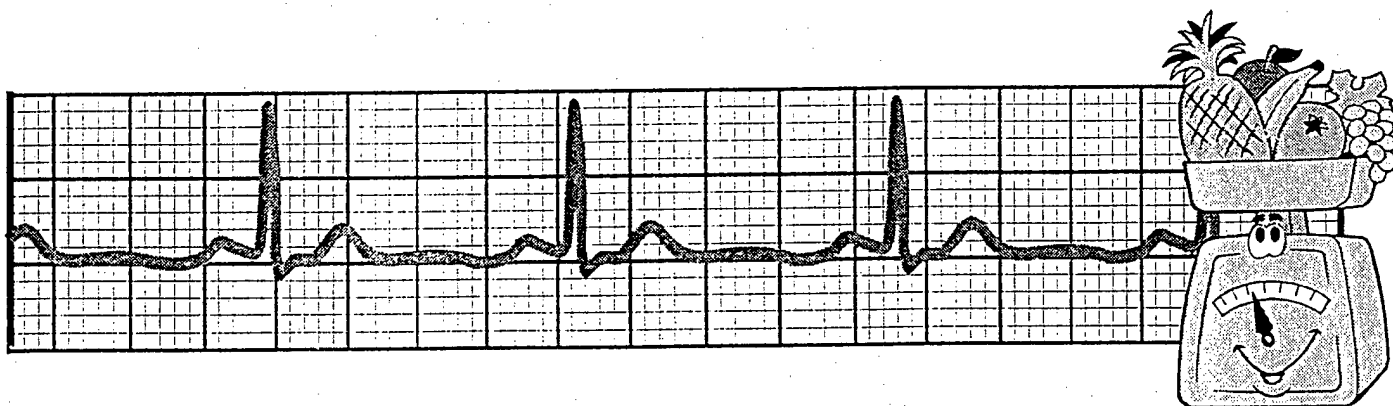
*Lifestyle*  
**Exercise**  
**Attitude**  
**NUTRITION**

- \* Develop Healthier Eating and Exercise Habits
- \* Learn a Secret for Losing More Weight and Keeping It Off Longer
- \* Calculate Your Calorie and Fat Gram Needs for Weight Loss
- \* Learn How to Become a Food Fat and Calorie Buster
- \* Survive Food Temptations
- \* Class Session with Opportunity for Personalized, Individual Follow Up

**\*Are you Active Duty?**

If so, you are eligible to enroll in a research study 11 February through 11 March '99 with the intent of helping you to maximize your weight loss efforts by keeping food records.

*No need to weigh in*



**Call the Nutrition Clinic at 2-7587 to schedule your appointment today!**